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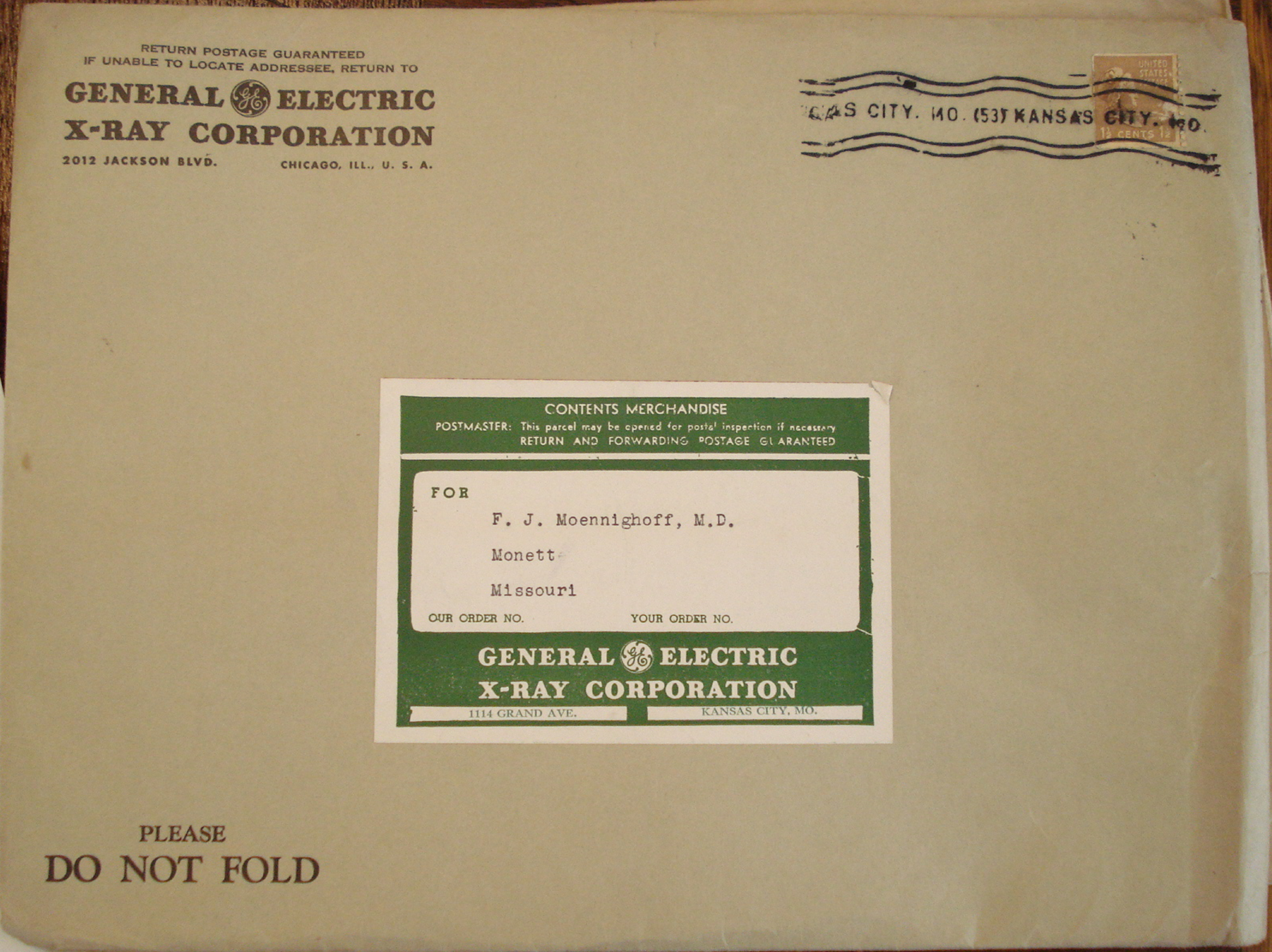

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CHICAGO
May 2, 1939

Dr. F. J. Moennighoff
313 Broadway
Monett, Missouri

Dear Dr. Moennighoff:

In response to your request, we are sending to you literature describing the G-E Model "C" Electrosurgical Unit (Spark Gap Type); also, authentic clinical data dealing with the values of electrosurgery in selected cases.

The G-E Electrosurgical Unit (Spark Gap Type) provides a quality of current suitable for tissue cutting, coagulation and dehydration, either alone or in combination. The surgeon has personal control of the instrument and is provided with convenient regulation to alter immediately the cutting current or the coagulating current without diverting his attention from the field of operation.

This outfit has been employed satisfactorily in conjunction with the various types of resectoscopes in use today. The cutting and coagulation properties of the current produced and convenience of regulation adapt this instrument ideally for urologic work, particularly for the resection of prostatic obstruction through the urethra.

The G-E Electrosurgical Unit measures up to all requirements of the medical profession for an outfit extremely compact and portable, yet so constructed as to meet all of the requirements for electrosurgery. The correctness of design insures its unfailing operation.

Convenience of regulation and control of the currents by manipulation of the selector switch and foot switch simplifies the operation of the outfit. Intensity of the cutting and coagulating current may be finely controlled to facilitate duplication of any given setting.

Refined control and current quality permits instant cutting and coagulation with a minimum of muscular sensation. The unit is shock proof. By this we mean that there is no danger of delivering to the patient or operator the current from the line.

The price of this unit complete with foot switch, three surgical handles with cords, surgical electrodes, body electrode with attachment cord and instrument rack, for operation on 115 volt, 60 cycle, alternating current, is $447.00 f.o.b. Chicago. The price of the mobile stand to support the outfit is $35.00. A convenient deferred payment plan may be arranged through our representative if desired.

Should you desire further information relative to this unit or a demonstration, may we ask that you communicate with the General Electric X-ray Corporation, 1114 Grand Avenue, Kansas City, Missouri.

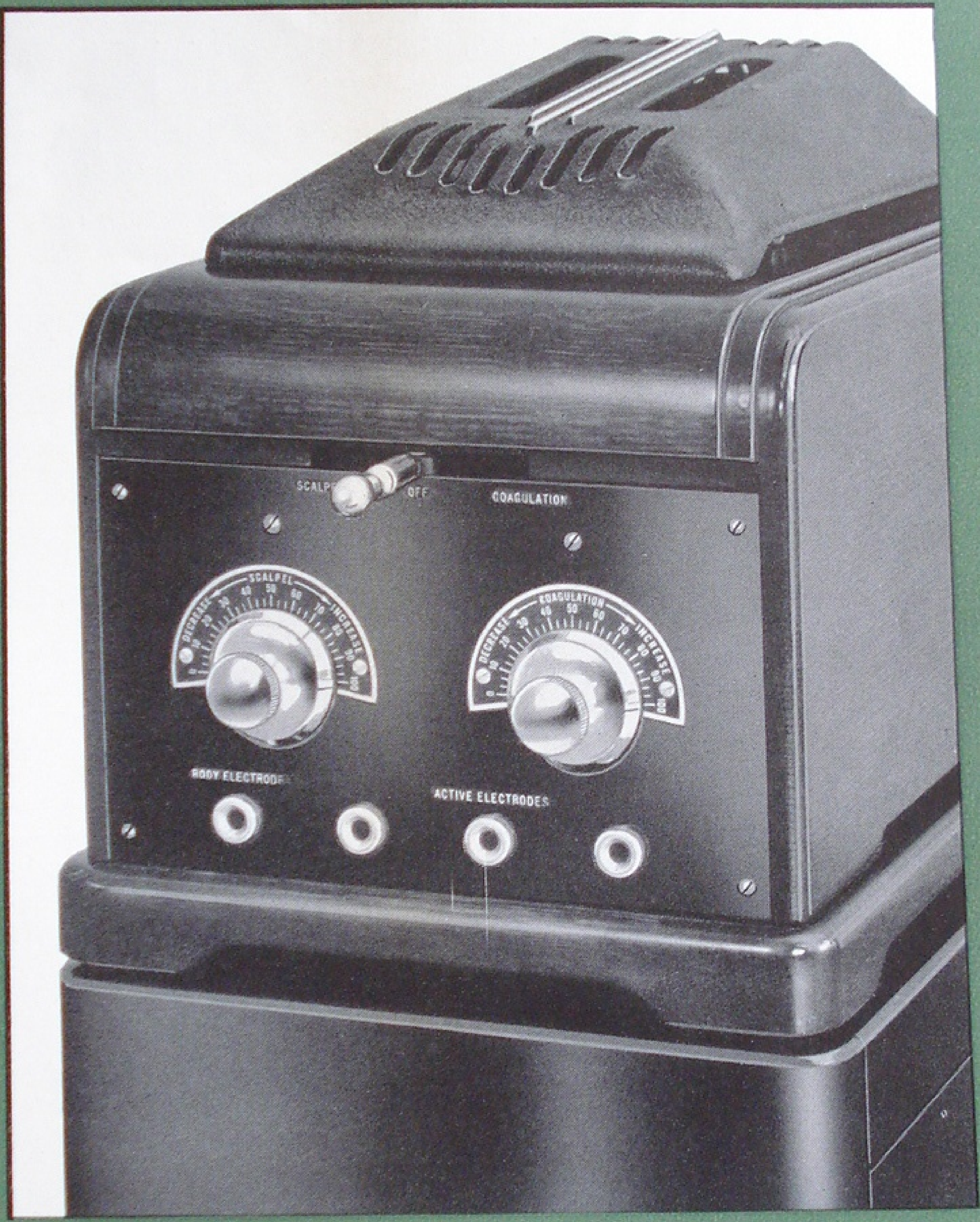
Very truly yours,

H. N. Seversen

Physical Therapy Section

HNSeversen:YD

FOR ALL ELECTROSURGICAL PROCEDURES



The G-E Model C Unit

GENERAL ELECTRIC X-RAY CORPORATION

Foreword

THE role of electrosurgery is, as a rule, a major one, hence it is of prime importance that an electrosurgical apparatus meet certain fundamental requirements, chief of which is dependability under all operating conditions. Control of current must be not only exact but extremely convenient and infallible.

This booklet depicts and describes an apparatus which meets these basic requirements adequately—the General Electric Model "C" Electrosurgical Unit. For the sake of real dependability, the G-E Self-compensating spark-gaps have been designed, gaps that assure a smooth even flow of current regardless of the demand put upon them. Surgeons will appreciate, too, the reserve power of the unit, available when occasion requires. The number of controls is minimized and their position such as to make for greater convenience.

The G-E Model "C" Electrosurgical Unit is for the large or small hospital, surgeon, dermatologist, urologist, gynecologist, or general practitioner. It will serve faithfully and satisfactorily, meeting every technical demand put upon it. It is ruggedly constructed throughout to give dependable, gratifying, useful service.

Evaluation of Electrosurgery

From a review of the subject by Drs. Kelly and Ward,* we extract the following:

"The demand for electrosurgery arose from imperfections in the established surgical technic, long accepted as inherent in operative methods and, therefore, hardly realized until the new agent and the acquired facility necessary to its skilful application appeared to remedy them.

"The reproaches indicated have lain in the prolongation of operations due to the application of ligatures to stop hemorrhage; in the liability of conveying infection or of distributing it in the general course of many operations; in the fact that ligatures acting as foreign bodies may become foci of infection; in the deplorable manipulations of tissues; in the contamination of wounds and general messiness of handling malignant growths and chronic and subacute infections; in the limitations often imposed on our extirpative work by reason of the depth of the operation from the surface, particularly in the oral and nasal cavities, in neural surgery, and in rectal and sometimes in abdominal procedures; in the fact that any serious difficulty of ligation in sharp hemorrhage in a deep operation often precludes a satisfactory continuation to its completion; in the condition of tissues after recovery, which makes a desirable secondary operation objectionable; in shock arising from prolonged operation with attendant hemorrhage. Experience has shown that these objections are in a measure overcome by electrosurgery.

"The cardinal virtues of electrosurgery lie in effective destruction in loco of tissues that it is desirable to eliminate. This manifestly includes all forms of malignancy. There is no handling of tissues, because of the knife and fork type of operation, which is unequalled in cleanliness by the immediate complete sterilization of both bacterial and malignant infection.

"Hemostasis is easily effected in severing vessels up to about 1 mm. in diameter, either by the application of the coagulating electrode direct or by the intermediary of a well-pointed hemostatic clamp, isolating the vessel. Thus ligatures are avoided, and the risk of infection is lessened by reason of the reduction of the imported foreign material. The ability to check hemorrhage, keeping the fingers away from the wound, makes it possible to continue deep work in various parts of the body.

"Another advantage is the extended use of local anesthesia, which reduces hospitalization by making a number of these patients ambulatory."

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*Electrosurgery—A Brief Review of Its Advent and Some of Its Uses. By Howard A. Kelly, M. D., and Grant E. Ward, M. D., Baltimore. Jour. A. M. A., Feb. 20, 1932. (We will send a complete reprint of this article on request.)

Definition of Electrosurgical Currents

The General Electric Model "C" Electrosurgical Unit provides cutting, coagulating, and desiccating currents, to be used alone or in combination. These currents are of very high frequency, far beyond that which elicits neuro-muscular response.

Electrosection is that method in which the current is utilized for the destruction or excision of tissue. The effect of this current when applied as an arc through one of the active electrodes used for the purpose, is that of cutting or severing. Kelly and Ward have referred to this action as molecular disintegration, an explosion of each individual cell caused by the extreme heat of the electric arc between electrode and tissue.

Electrocoagulation. The current required for coagulation is more highly damped than for electrosurgery, and in many cases a duoterminal electrode is employed. The tissue, instead of being cut by an arc, is actually destroyed by being boiled in its own fluid by high temperature. The necrotic tissue, after coagulation, usually detaches itself and results in the formation of remarkably little scar tissue.

Electrodesiccation. Application of damped high frequency current through a needle point electrode held in contact or at a slight sparking distance, results in dehydration and shrinkage of superficial tissues. Since with this type of cell destruction there is little degenerative change and but a small amount of disintegrated material, there is only a small amount of fibrous tissue formed. This explains the excellent cosmetic results usually obtained with electro-desiccation.

Advantages of Electrosurgery

1.—Minimizes capillary oozing and conserves blood for patient.

2.—Produces a cleaner operating field, hence better visibility.

3.—Reduces the possibility of the dissemination of malignant cells or infectious materials.

4.—As cutting is accomplished by a small arc ahead of the electrode and does not depend upon mechanical pressure, there is a material reduction in trauma.

5.—Reduces the number of ligatures in the wound.

6.—Operation is more rapid due to the reduction in the number of ligatures and hemostats which obstruct the field.

7.—Eliminates much of the handling and sponging of tissue.

8.—Current contact with hemostatic forceps effective in coagulating or sealing bleeders.

9.—Reduces the incidence of infection.

10.—Offers advantage in extirpative surgery in orifices or deep operations.

11.—Because operation is shortened, local anesthesia can be used more often.

12.—Properly performed, offers little danger of secondary hemorrhage.

13.—End result associated with less scar tissue and contraction. Condition of tissues upon recovery facilitates a second operation if necessary.

14.—Healing more rapid than in average surgical case left to granulate.

15.—Invaluable for securing biopsy specimens.

Uses of Electrosurgery

Prostatic Surgery

Transurethral resection of prostatic obstruction of the bladder neck, bars at the vesical neck, contractures, benign hypertrophy, malignancy, etc.

Breast Surgery

"Electrosurgery fulfills the ideal conditions of breast surgery by sealing lymphatics and small blood vessels as it severs the tissues, thereby reducing the risk of dissemination of tumor cells."*

Neoplastic Surgery

"In this field the sterile wound as obtained with the cutting current is of prime importance. As very little pressure is exerted on the cutting electrode, there is substantially no danger of mechanically forcing malignant cells into adjacent healthy tissue."*

Neuro-surgery

(Intracranial tumors). "Electrosurgery is distinguished by the ready means of hemostasis, the reduction in trauma, the greatly lessened danger of reimplanting viable cells, and the bettered visibility in the operating field."*

Thyroid Surgery

"In diseases of the thyroid, electrosurgery has been used with great advantages especially in malignancies and highly toxic goiter."*

Intrapleural pneumolysis

"The electrosurgical method is superior to the cautery. There is no smoke in the chest, no burned tissue, there is less post-operative bleeding."

Skin Surgery

Removal of benign and malignant lesions. "The relative ease of application of the current, the marked reduction in bleeding which sometimes amounts to complete hemostasis in removing large tumors, and the rapid growth of healthy granulations bespeak electrosurgery as the method par excellence for this group."*

Oral Cavity Surgery

Excision of malignant and benign tumors.

Rectal Surgery

"Electrosurgery simplifies the removal of growths ordinarily difficult of access as in, for instance, the rectum."*

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*Quotations from "Electrosurgery," Kelly & Ward, Wm. Saunders Company.

Uses and Advantages of Electrocoagulation

Hemostasis

With the coagulation current, even fair sized vessels can be readily sealed off either before or after severing. Coagulation is particularly valuable in checking troublesome bleeding or oozing from small vessels and by this means the use of clips and ligations can be minimized. This same current is used for superficial dehydration to dry out and seal off capillaries, lymph ducts, and smaller blood vessels. This forms an excellent means of checking oozing or slow bleeding from relatively large areas.

Extirpation of Tonsils

"Leaves the tonsillar fossa clean, unscarred, and free of all menacing sources of infection." (Jaros, Arch.P.T., X-Ray Radium, June, 1936.)

Extirpation of Hemorrhoids

"External and internal hemorrhoids are quickly destroyed with little or no loss of blood. After pain is undoubtedly lessened by the coagulum which covers the nerve endings." (Kelly & Ward, "Electrosurgery").

Shrinkage of Turbinates

"Absence of bleeding permits direct vision during treatment. Nasal discharge following coagulation is negligible. Patient needs no hospitalization nor loses time from routine work. Proper topical anesthesia produces a painless operation with symptomatic relief that is frequently immediate and striking." (Jaros, Arch.P.T., X-Ray, Radium, Sept. 1933).

Cervical Coagulation

"Lessens danger of atresia, hemorrhage, stenosis, or other sequalae. A most important result is the soft flexible nature of the new lining of the cervical canal. The electrocoagulation method of treating cervicitis is a prophylactic treatment of cancer of the cervic." (Kimble, Arch. P.T., X-Ray, Radium, September, 1933.)

Circumvallation of Malignancies Prior to Operation

"The plan is to place a rampart of coagulation about the entire area to be removed, situated out in the zone of the undoubtedly sound tissues. The advantages of this procedure are to stop all lymph and blood drainage and to cut off any efferent nerve impulses by coagulating the nerve ends, thus reducing post-operative pain. Escape of deleterious particles from the diseased area is largely prevented." (Kelly & Ward, "Electrosurgery.")

The General Electric Model "C" Electrosurgical Unit

To fully appreciate the flexibility, dependability, and wide range of this new type electrosurgical unit and the fineness of its control, it is proper to consider briefly the principles which must be followed in the design and construction of equipment for electrosurgery.

Essentially, a spark gap oscillating circuit consists of the spark gap, a capacitor, an oscillation coil, and high tension transformer for charging the capacitor. Each plays its important part in the scheme and all must be present and properly adjusted if the instrument is to produce a smooth, powerful, dependable cutting current. There must be a reserve for such uses as operative technics under water as in prostatic resection where power beyond the average requirements is essential.

The method of control must be positive, convenient, and dependable. The equipment must be shockproof and as much of it as possible should be sterilizable, certainly those parts with which the surgeon or patient come in contact.

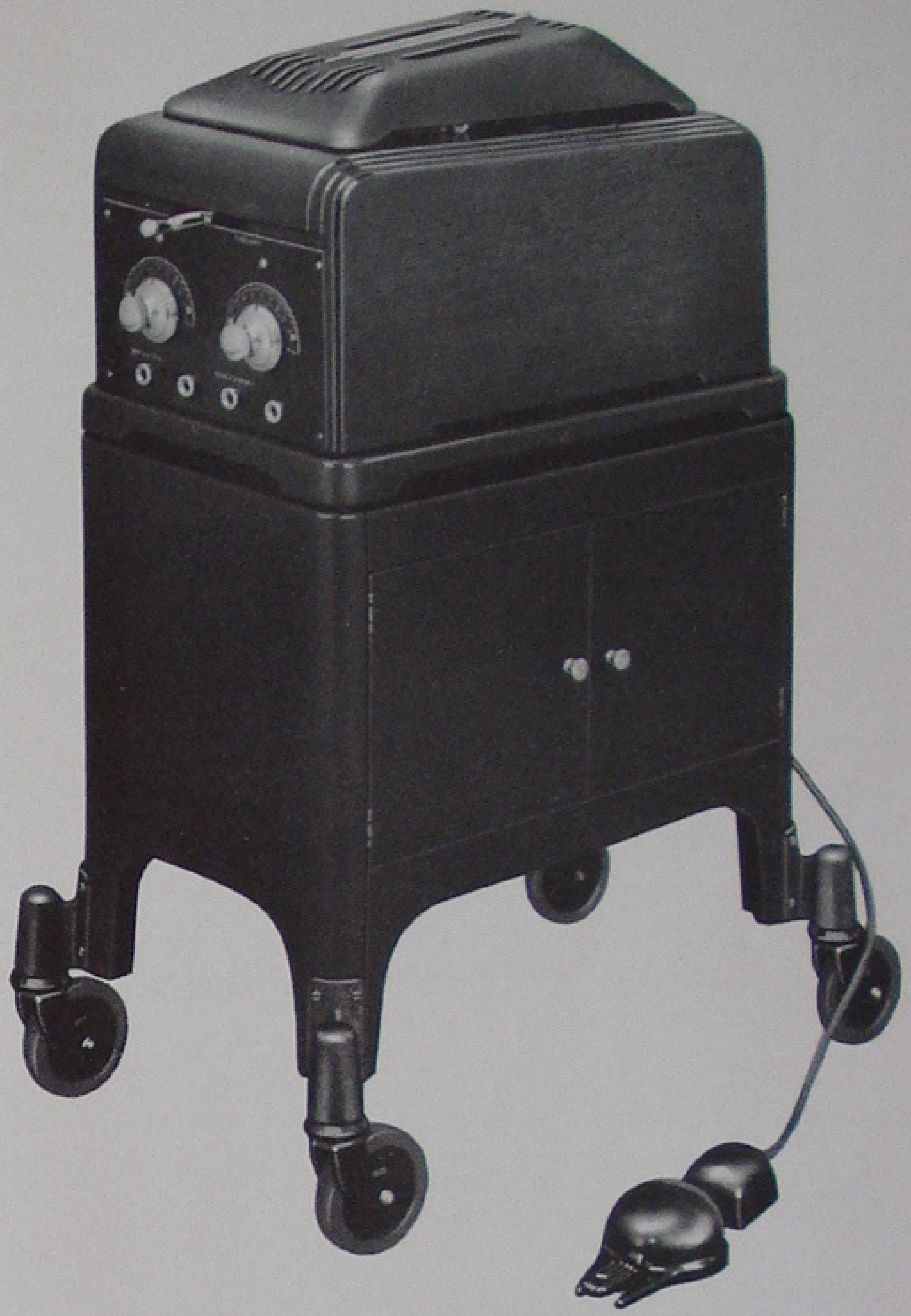
Read how G-E Engineers have designed the Model "C" Unit to more than meet all of these exacting essentials.

The Self-Compensating Spark Gap

The spark gap of an electrosurgical apparatus is literally the "heart" of the unit. It must, for best operation, be fixed as to the space between the tungsten buttons which form the actual gap and, regardless of the amount of heat generated at this point, normal expansion of the tungsten buttons or of the shank to which they are fastened must not affect the gap separation measurably.

With the G-E Self-Compensating gap there is no appreciable change in the spacing of the gaps even under long continued operation. The natural tendency of the tungsten buttons (which provide the sparking surfaces) to expand toward one another under heat, is offset by the expansion of the anchored heavy metal shank to which the tungsten is affixed. So closely calculated has been the expansion in these parts that the gap, instead of narrowing, remains practically in status quo.

The result of this faultless engineering is a type of gap which is not likely to fail even under the heaviest duty. There are four gaps in series to make possible added fineness of control and increased dependability.



The G-E Model "C" Electrosurgical Unit made mobile by the addition of a roomy sturdy cabinet equipped with easy-rolling rubber-tired casters.

Two Separate Circuits

Two separate and distinct high-frequency oscillating circuits are provided, each intended for a specific purpose. The gaps and transformers are common to both as are, too, the electrode connections. From one circuit the quality of the current is best suited for cutting; the other gives a highly damped wave form best suited for coagulation.

Simplified Control

One selector switch, with sterilizable handle, makes it possible for the operator to change instantly from cutting to coagulating current as occasion demands, without releasing the electrode he is using at the time.

Two dial controls (with sterilizable knobs) immediately below the selector switch are for regulating the intensity of the currents. They are of the variometer type, making possible absolute control over an infinite range. The dials are graduated from 0 to 100 to facilitate duplication of technics. A foot switch completes the control system.

Three Different Electrodes Always Available

Three operating electrodes can be attached to the Unit and placed on the sterilizable instrument rack. Thus, the surgeon can simply pick up the one needed at the moment, saving time and avoiding changing cords or replacing instruments in handles.

With each Model "C" Electrosurgical Unit a set of 6 different electrodes is supplied. In addition to these, electrodes for special purposes are available. These include the McCarthy Prostatic Electrotome, Braasch-Bumpus Median Bar Excisor, Kimble-Jaros Endocervical Electrode, Jaros Duoterminal Tonsil and Turbinate Electrodes, and Hyams Cervical Conization Electrode, described in later paragraphs.

Naturally, the wide range of service possible with the G-E Model "C" Electrosurgical Unit will only be fully realized with a full assortment of electrodes at hand.

Sterilizable Controls and Electrodes

All operating electrodes as well as handles, control knobs, handle of the selector switch, and instrument rack can be sterilized by autoclaving or cold antiseptic solution. Therefore, no unusual precautions are required in order to maintain asepsis.

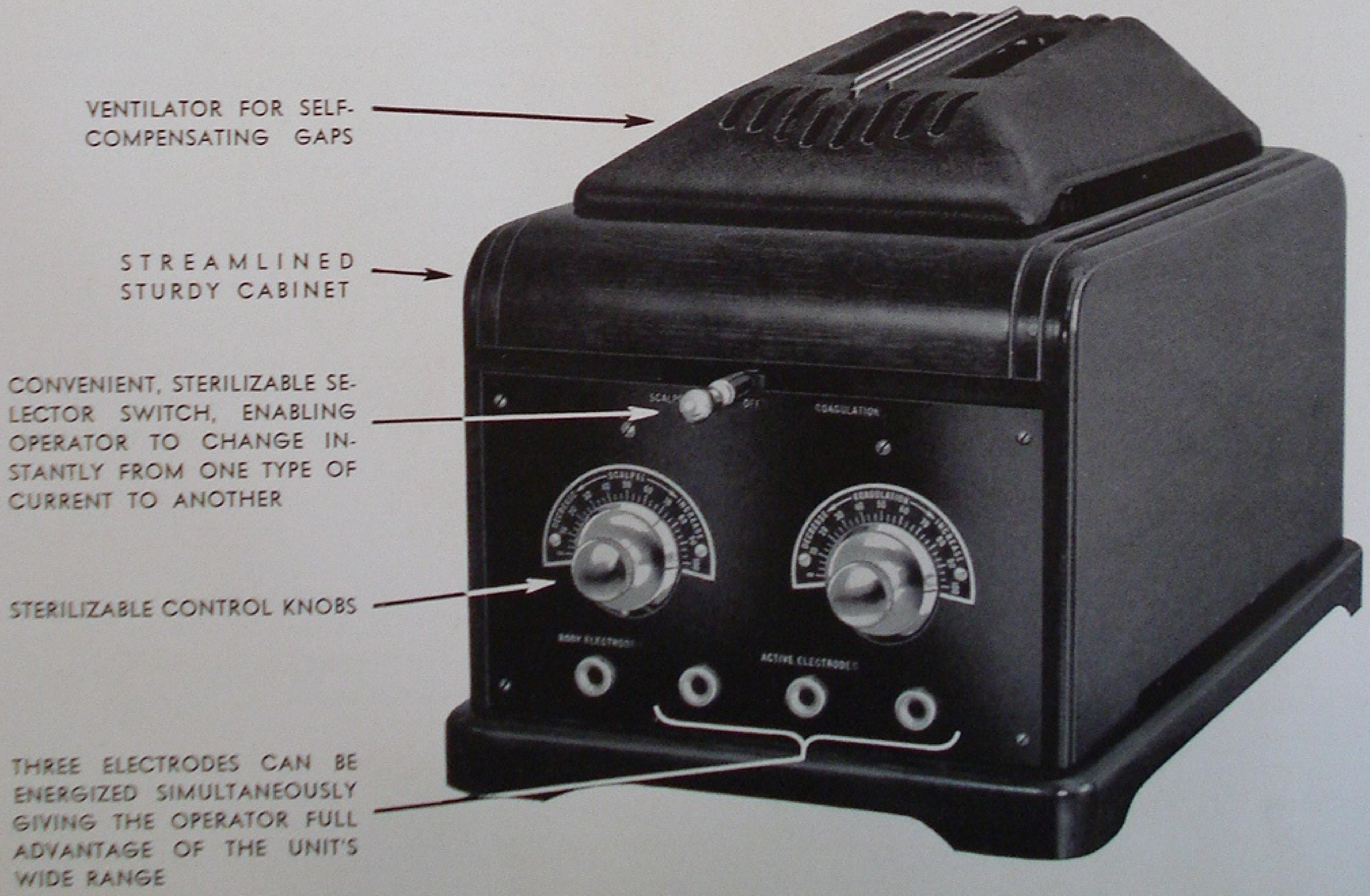
Shockproof Construction

As previously stated, the output of the apparatus is high-frequency current which does not elicit neuromuscular response. There are no exposed parts of the unit which carry electrical currents except the outlet terminals and these are deeply recessed so that accidental contact is practically impossible. The Model "C" Unit is electrically safe.

Yes, and trouble-proof if given reasonable care. It should require no other service than occasional cleaning and reconditioning of the spark gaps which will be taken care of by a representative of the General Electric X-Ray Corporation. There are no moving parts to wear out; from top to bottom the apparatus is rugged, built to stand up under heavy duty.

Compact and Mobile

The factor of mobility was fully considered in the design of this unit. It occupies a space of only 21½x 13 inches at its base, and has an overall height of 14 inches. Mounted on an attractive and sturdy cabinet, which has plenty of room within for accessories, the


VENTILATOR FOR SELF-COMPENSATING GAPS
STREAMLINED STURDY CABINET
CONVENIENT, STERILIZABLE SELECTOR SWITCH, ENABLING OPERATOR TO CHANGE INSTANTLY FROM ONE TYPE OF CURRENT TO ANOTHER
STERILIZABLE CONTROL KNOBS
THREE ELECTRODES CAN BE ENERGIZED SIMULTANEOUSLY GIVING THE OPERATOR FULL ADVANTAGE OF THE UNIT'S WIDE RANGE
SCALPEL
OFF
COAGULATION
BODY ELECTRODE
ACTIVE ELECTRODES

apparatus is at convenient operating height and may be moved easily wherever needed. Purchase of the mobile cabinet is optional.

Reasonable in Price—Easy to Buy

A small initial investment is all that is required to put this fine apparatus in service in your office or hospital; the balance can be handled under the General Electric low-interest payment plan.

Possession of this Unit opens a wide field of surgical possibilities, meriting its consideration by every surgeon and institution.

Specifications

Overall height, 14 inches; overall width, 13 inches; overall depth, 21½ inches. Net weight, approx. 75 lbs.

CODE	CAT. NO.	
PENEF	P0029A	100/130-v., 50/60-cy., Model "C" Electrosurgical Unit, with set of 6 surgical electrodes and electrode rack.
PENHI	P0029B	200/260-v., 50/60-cy., with A8012A auto transformer in separate carrying case. Otherwise same as above.
PENIJ	P0030A	Mobile cabinet for Model "C" Electrosurgical Unit.

Universal Coagulation Handle

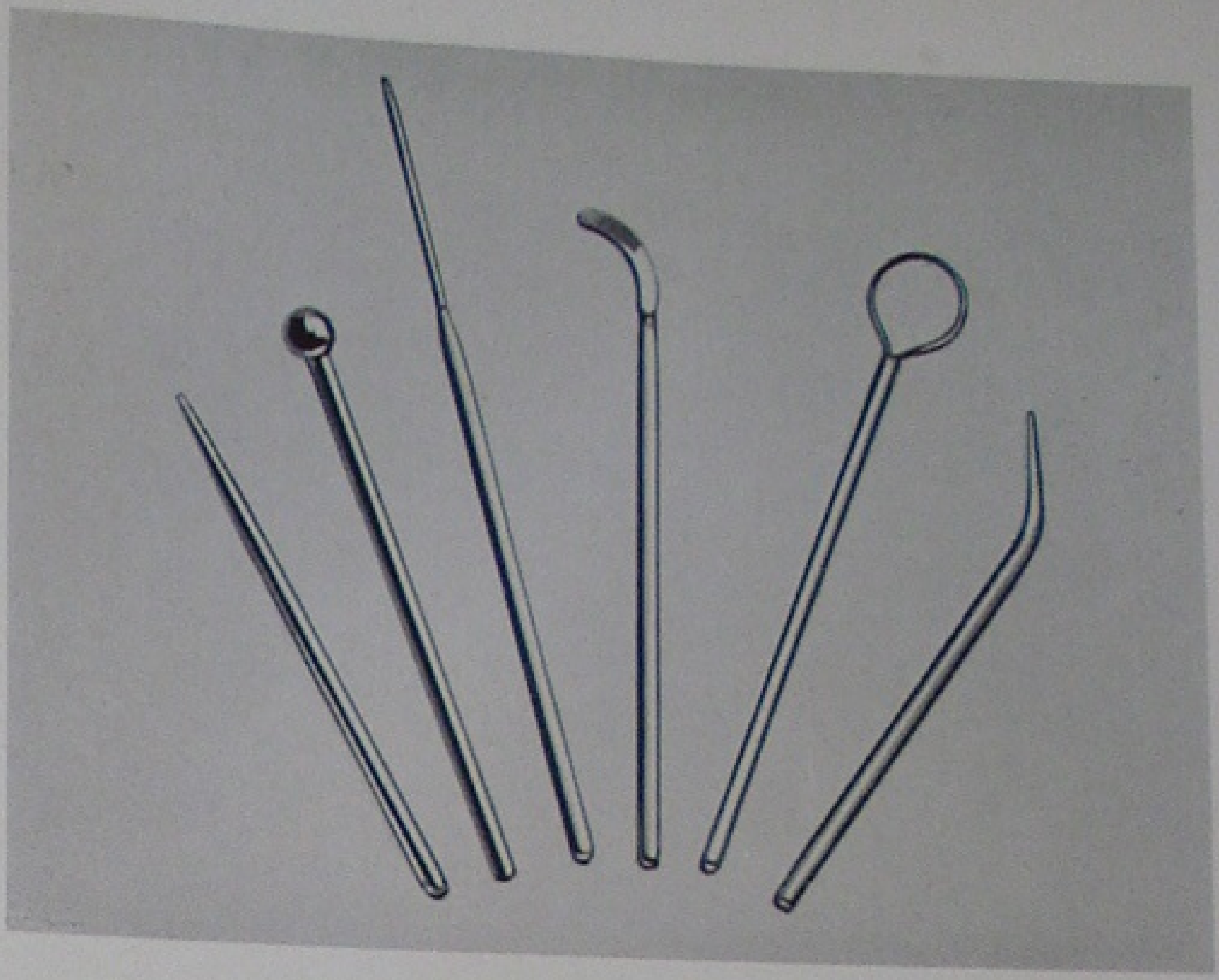
(*Boilable*)

This decagonal handle of insulating material, ⅜" in diameter, is equipped with chuck to hold needles for electrocoagulation and is tapered to permit unobstructed view of operating field. Handle and cord can be boiled for sterilization. Handle is available for use with all diathermy needles, or comes equipped with two fulguration needles to fit surgical diathermy electrodes. A soft rubber insulating sheath is also obtainable for use in heavy fulguration.

G-E Conization Electrode Set

Use in eradication and destruction of diseased endocervical mucous membrane and its contained glandular structures by the Hyams method.

Consists of handle, cord, and three tip electrodes. Tips and handle can be sterilized in cold solutions. Insulation on the longitudinal electrode tip extends beyond the end of the active element to protect the internal os. Handle is freely rotatable; a spring maintains even contact on the current carrying part of the electrode.



Surgical electrodes which accompany each Model "C" Electrosurgical Unit.

Jaros Duoterminal Electrodes

For Turbinates: Flexible distal portion rigid enough so that sufficient operating pressure may be exerted. Will retain shape after being bent into position. Reduced size of tip gives greater visibility of operative field. Actives terminals may be bent to straddle the tissue under treatment.

For Tonsils: Semi-rigid shank may be adjusted to bring any part of the area to be treated into the line of vision. Active points can be separated (for slow, massive coagulation) or approximated (for rapid, accurate, localized work). Large diameter of active points allows gradual spreading of coagulation over treated areas. No fulguration at point of application.

Jaros Duoterminal Electrodes are practically unbreakable. No necessarily detachable parts, yet easily removed from cord.

Kimble-Jaros Erosion and Endocervical Electrode

Closely bound spiral electrode allows destruction of tissue to any desired depth, facilitating cervical coagulation. Energy limited to area under treatment. Electrode end produces a current pathway of ⅛ inch as ordinarily required to produce coagulation on the vaginal surface of cervix. It is long enough to reach the internal os.

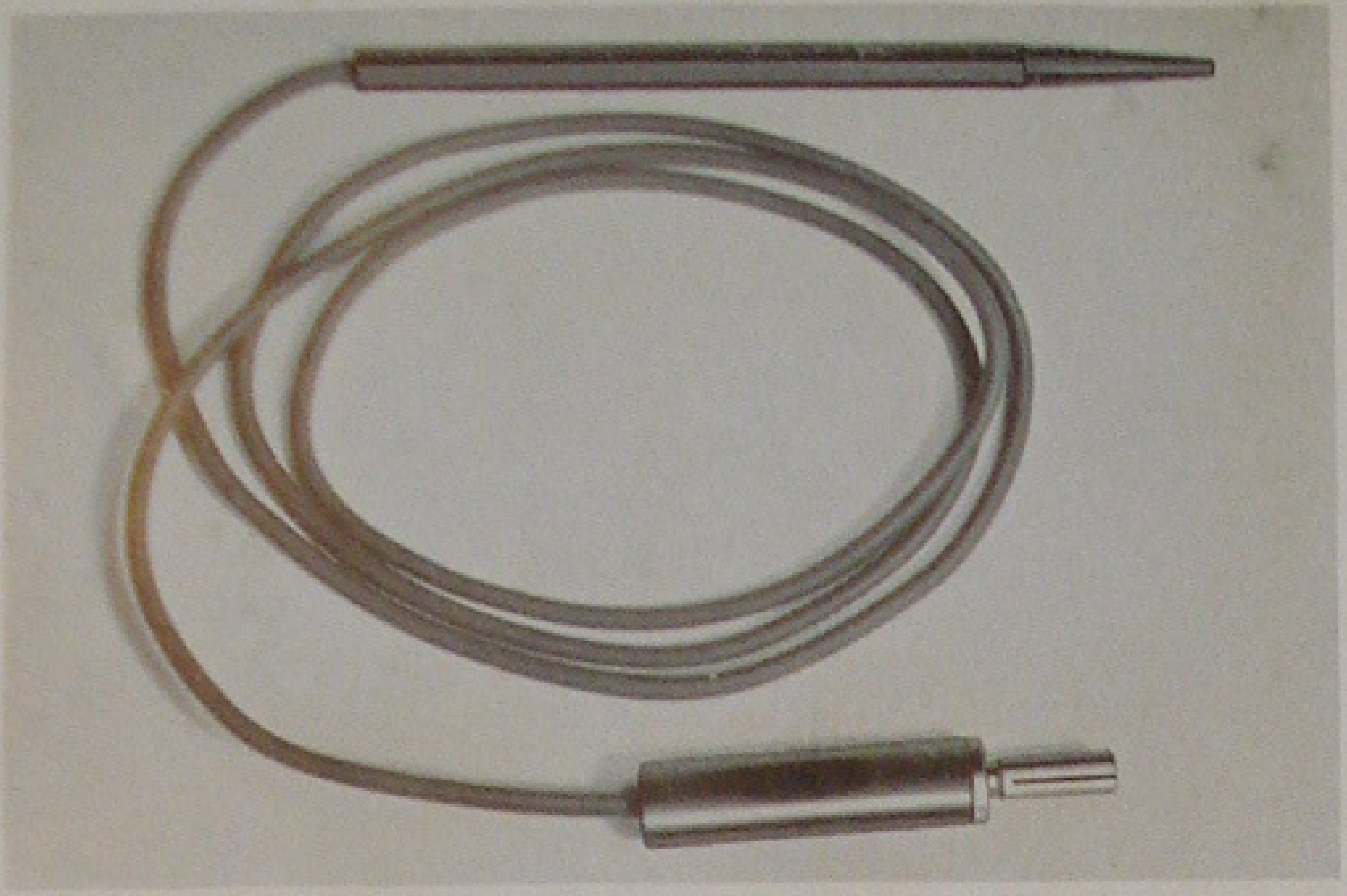
Hagedorn Needle

For intramural electrocoagulation of turbinates. Fits the Universal Coagulation Handle.

Bladder Fulguration Electrode

(*Bugbee Type*)

This instrument, for destruction of villous tumors



Universal Boilable Handle.

of the bladder, is introduced through the channel of an irrigating cystoscope. Electrode wire is covered by an insulating waterproof material except at the tip. Connection between cord and electrode is positive, a locking friction grip, and the cord is so designed that no metal connection is exposed.

Diathermic Epilation Needle

(Bordier Design)

For treatment of hypertrichosis. Tempered steel with perfect flexion. Blunt point, about 2/10mm. diameter, will not pierce walls of follicle as it is inserted. Dielectric insulation except at tip to localize coagulation to subcutaneous layer of tissue at bottom of follicle. Fits Universal Coagulation Handle.

Electrotomes — Thoracoscopes — Other Accessories

We can furnish any of the "American Cystoscope Makers, Inc." prostatic resection instruments, thoracoscopes, etc., which are used with cutting machines. Quotations on request.

Other accessories needed in electrosurgery or electrocoagulation are Electrode Foil for dispersive electrode plates; Electrojell, for use as a safety contact medium to prevent burns and unpleasant skin reactions in the application of diathermic and electrosurgical currents; and Electrode Clip Connectors, for use with electrode foil to hold cord terminals. These accessories are listed on the enclosed price list.

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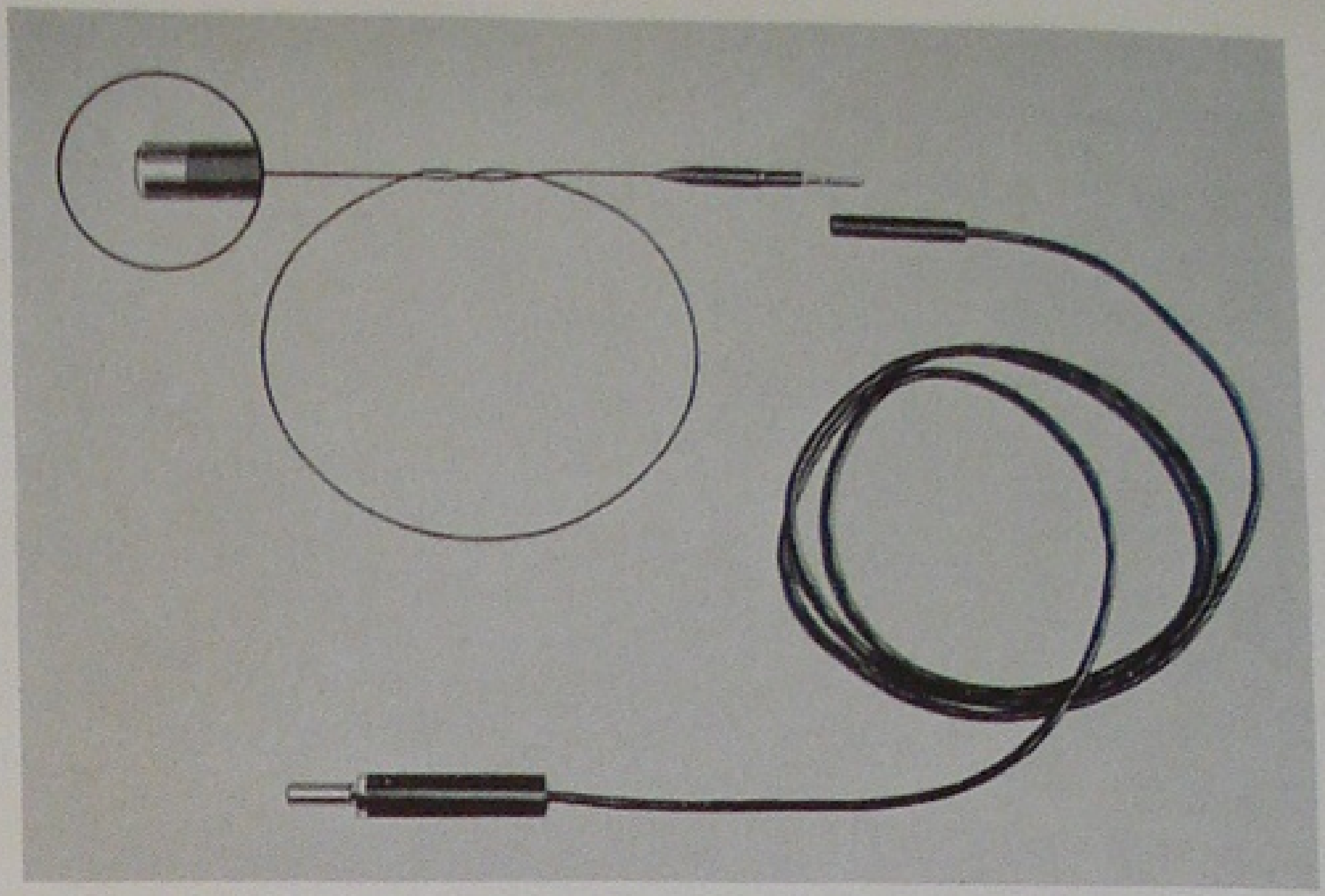
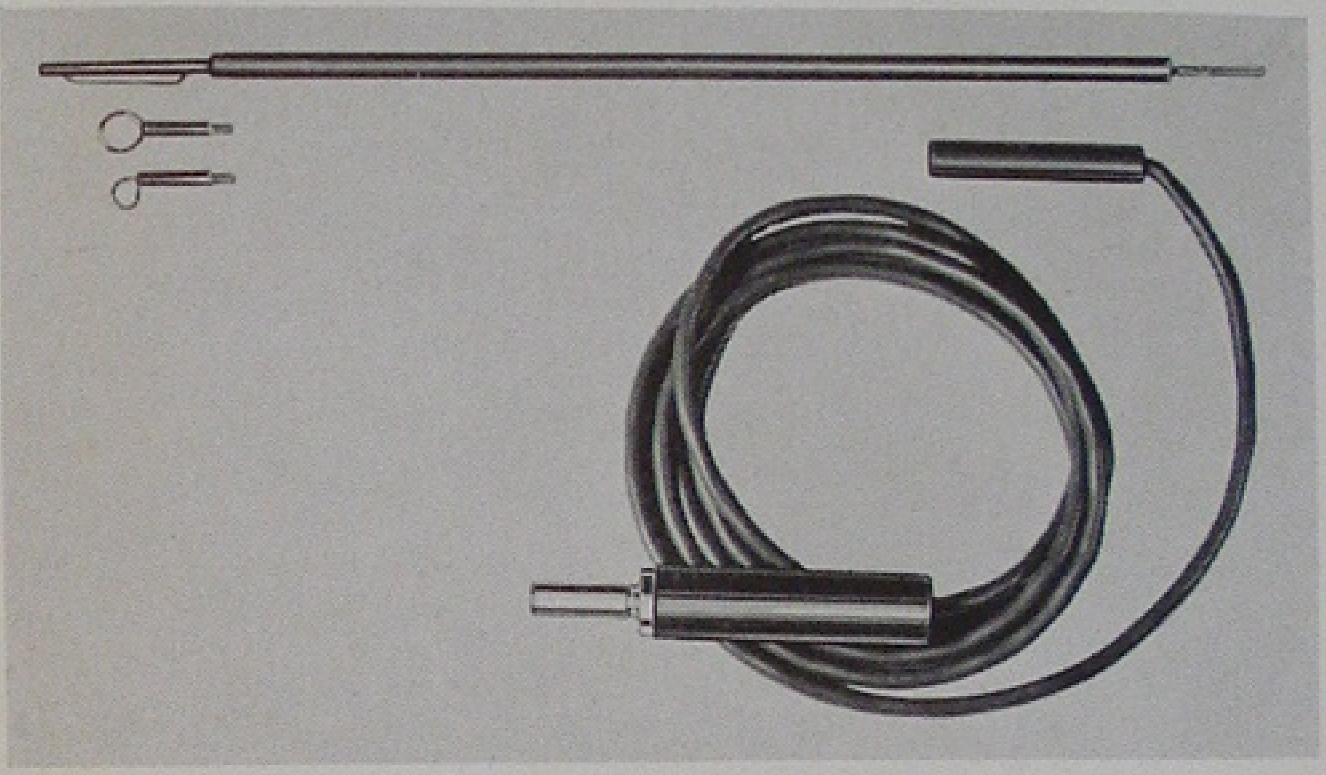
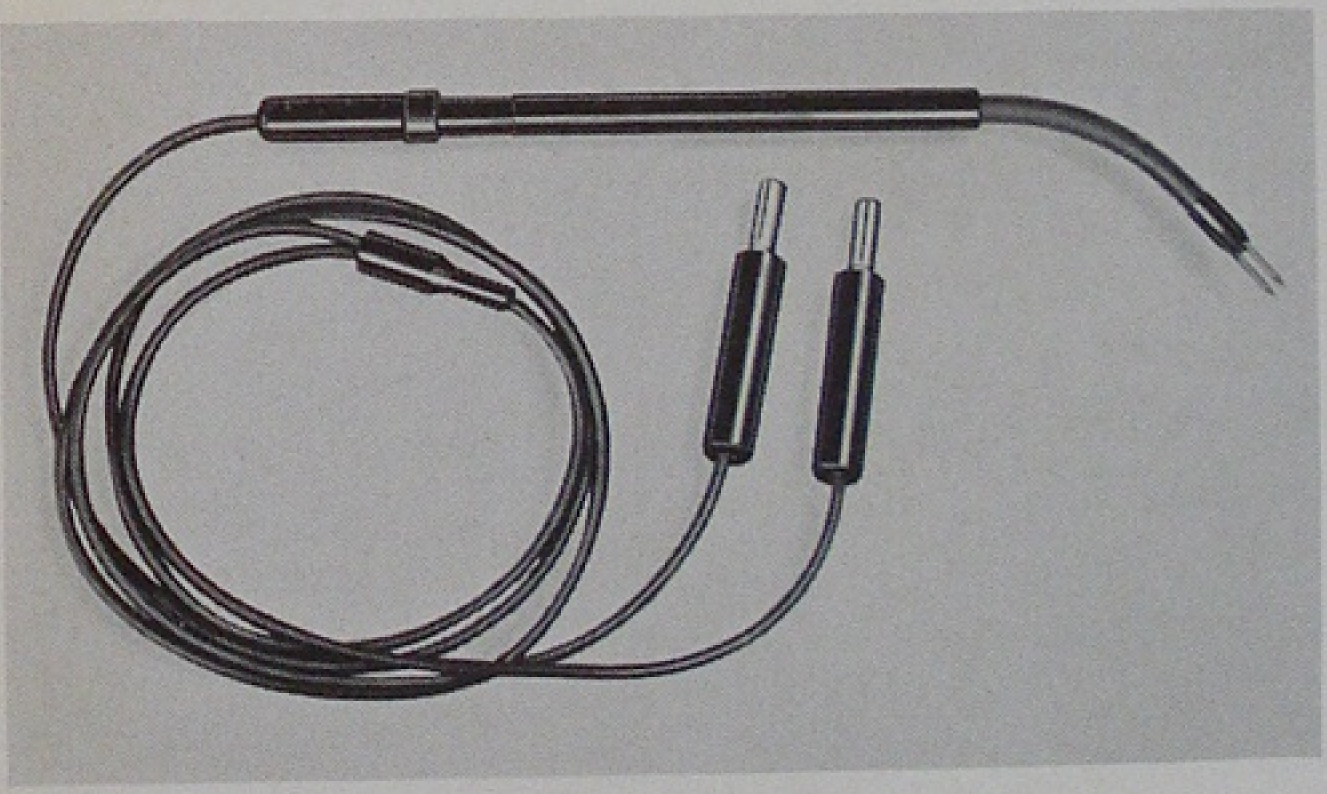


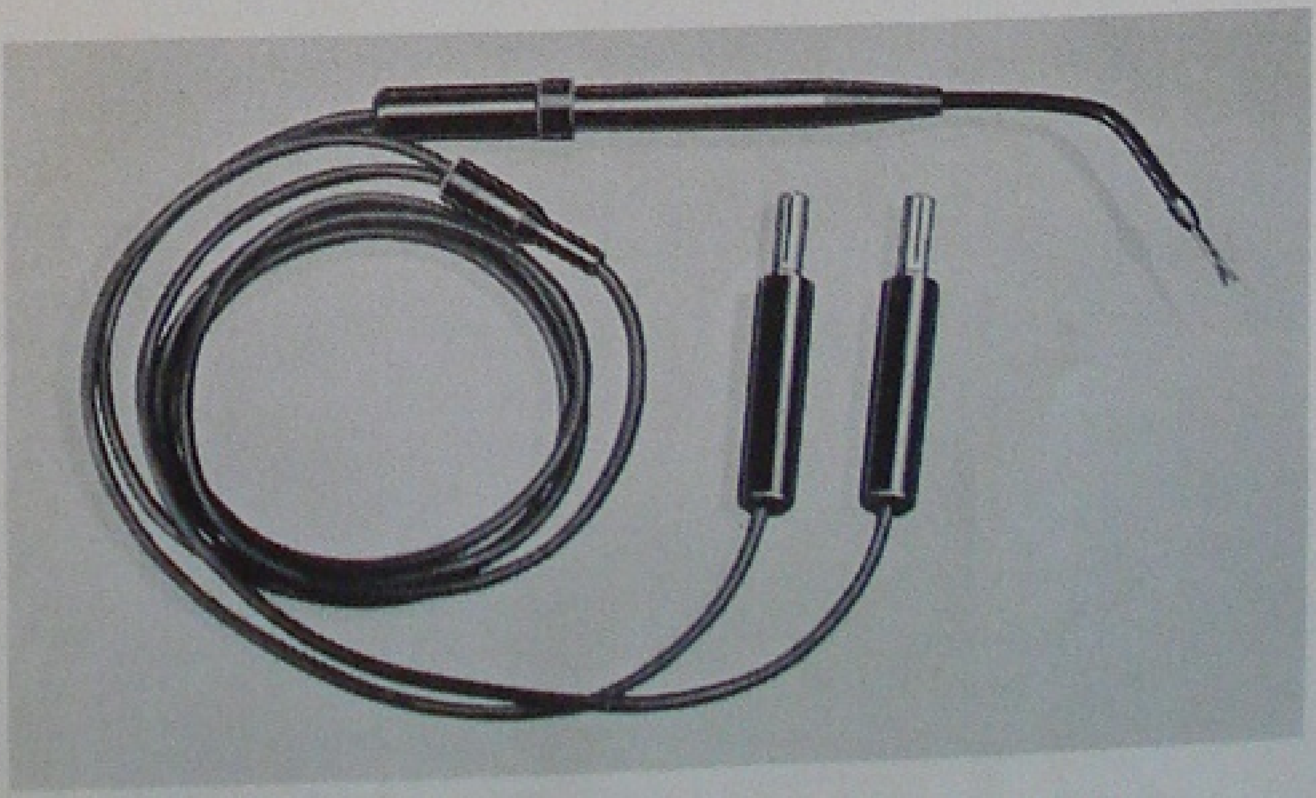
Bladder Fulguration Electrode.



Hyams Conization Electrode.



Jaros Duoterminal Electrode for Tonsils.



Jaros Duoterminal Electrode for Turbinates.

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